Strategic Vision for LBNL's Home Energy Web Tool

LBNL's web-based home energy tools[1] provide interactive and customized decision-support environments for consumers and others involved in the residential energy efficiency marketplace. The sites offer powerful energy savings calculators and a rich array of content and links to support decision-making. Development began in 1994, with the Home Energy Saver. About 45,000 users visit the sites each month.

Mission – Provide the information and motivation that consumers and others (contractors, vendors, educators, students/educators, energy analysts, etc.) need in order to make well-informed decisions and implement energy-efficiency upgrades new and existing homes. The tools also support the federal energy mission by helping build national recognition of the ENERGY STAR brand and enabling consumers to quantify energy savings and environmental benefits achievable by participating federal programs.

Goals

- *Serve Diverse User Communities* – Interfaces for home owners/renters; professionals; educational; researchers/analysts; program designers/evaluators.

- *Support National Energy Policy* – Contribution to the national goals of improved energy efficiency and pollution prevention, both as tool for end-users and for policymakers.

- *Maximize Taxpayer Benefits of Public Interest R&D* - Increased consumer access to the results of previous taxpayer-funded energy information products and research & development on energy efficiency.

- *Ensure Objectivity, Inclusiveness, Accuracy* - Technology and fuel neutrality, coupled with credible and up-to-date analysis in a non-commercial user environment.

- *Provide for Transparency of Assumptions* - Fully documented and based on non-proprietary assumptions/algorithms.

- *Offer Regional and International Applicability* - Relevance to the diversity of climate conditions, housing stock, and lifestyle.

An important aspect of our mission is to complement and enhance private sector business activities within the context of the aforementioned goals. This is a natural extension of the technology transfer role that LBNL and its sponsors have played in the market for energy-efficient technologies and tools over the past 25 years. The project defines and advancse the cutting edge of web-based energy calculators and interfaces, and promotes

[1] Various related tools currently exist at LBNL (http://HomeImprovementTool.lbl.gov, http://HomeEnergySaver.lbl.gov, http://savepower.lbl.gov). For the purposes of this document, unless otherwise noted, we speak in terms of the combined content and services of the tools. Eventually, the tools may be merged.

technology transfer to home energy professionals and to private sector software developers.[2]

User Groups: Home Occupants, Professionals, Students/Teachers, & Analysts

The original users are homebuilders, homeowners, or renters interested in reducing their energy bills or environmental impacts. This group is composed of subgroups, depending on the decision they are making. Some need to replace a single item (e.g., water heater) in an emergency, others are planning a major home improvement project (e.g., kitchen), and others are contemplating more comprehensive upgrades. A second group includes contractors, vendors, and other professionals who provide goods and services (and advice). A third group is program managers, evaluators, and analysts who model prototypical buildings to understand the savings potential of various strategies. A fourth group is students and teachers who use the site as an educational tool. Each user group will be served by the same underlying engine and data, but will have access to interfaces and input/output environments tailored to their needs. The tools are currently designed for the U.S., but should be expanded so that they are applicable in other countries and climates.

Capabilities and Services: Current Status and Future Needs[3]

User Interface: Input Environment Serving Diverse Audiences

- Current sites provide ranked lists of upgrades with background information and links on a limited basis; expand to capture a wider array of upgrade options.
- Improvements to the interface are currently being identified via evaluation of other web- and disk-based tools.
- Better inter-linkages to other DOE/EPA sites (e.g. ORNL insulation calculator; EPA's Home Improvement Benchmarking Tool; eProcurement Project).
- Features are needed support evaluation of a single project or room addition.
- New interface (module) for students/educators.
- New interface (module) for professionals.
- New interface (module) for energy analysts/policymakers (e.g. for regional analysis)
- Multi-level interfaces (e.g. “simple”, “standard”, “power-user”)
- Multi-lingual versions to for communities with English as a second language

Owner/Renter User Interface: Output Environment Serving Diverse Audiences

- Current savings estimates are calibrated to the user-entered utility bills.
- Current savings estimates include pollution avoided.
- New outputs and reports are needed for professional users (e.g. HVAC sizing; peak and monthly analysis). Uncertainty analysis for all audiences.
- Home energy rating output reports

[2] More discussion of private-sector collaboration is available at: http://HES.lbl.gov/mission.html.
[3] A separate memorandum located at http://eetd.lbl.gov/HES describes potential improvements in more detail.

Content To Support Decision-Making and Action

- Content maintenance (link viability) is an ongoing need, currently unsupported. Newly available web-based resources should be evaluated linked as appropriate.
- Ensure linkages with other DOE and EPA tools and other web-based calculators.
- Curriculum and project-based content for the educational interface (module).
- More technical content for the professional interface (module)
- Regionally specific content should be added (e.g. local energy offices).

State-of-the-Art Modeling and Data

- Routinely incorporate new data, algorithms, and energy-saving technologies.
- Improved calibration to user-entered utility bills.
- Review and improve default data: e.g. upgrade cost data, RECS-based inputs, energy prices, utility-level prices and emissions, probabilistic default inputs.
- Improve models (duct modeling, equipment schedules, cool roofs, usage-based miscellaneous, high-use equipment, e.g., spas, upgrade to *EnergyPlus*).

Usability, Performance Assurance, Maintenance, and User Support

- Facilitate a positive and time-efficient user experience.
- Web site is fast and stable, and easily modified – improvements underway.
- Ongoing need for hardware and software upgrades and maintenance.
- Ongoing need for code debugging and troubleshooting
- Ongoing need to maintain/improve defaults (e.g. geographical differentiation).
- General energy questions are currently forwarded to the EREN "Ask An Energy Expert" service; routine questions are compiled into an FAQ.
- E-mail questions from users must be addressed in a more timely manner
- E-newsletter

Transparency & Documentation

- Many algorithms and data assumptions are currently documented, but gaps remain to be filled and out-of-date information updated.
- The methodology should be documented in the peer-reviewed literature.

Deployment

- The site generates traffic from external links, media coverage, and brochure.
- The software code should be conveniently licensable by third-parties.

Market Research & User Needs Analysis

- Assess user experience via on-line survey/feedback forms.
- Usage statistics are presently compiled, but should be thoroughly analyzed.